(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 433 887 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.06.2004 Bulletin 2004/27

(51) Int Cl.7: **D06F 37/06**

(21) Application number: **03016731.6**

(22) Date of filing: **22.07.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **26.12.2002 KR 2002084229**

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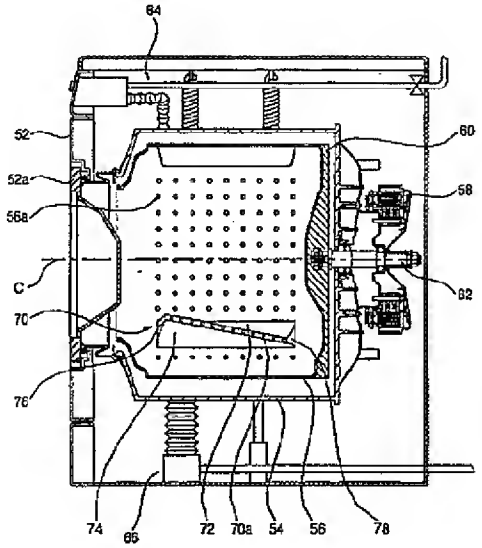
(54) Drum-type washing machine comprising a plurality of vanes

(57) Disclosed is a drum-type washing machine provided with a plurality of vanes (70,80), each including two inclined side surfaces (72,74;82,84), which are concave, installed at an inner wall of a drum (56) so that the laundry is easily caught on the inclined side surfaces (72,74;82,84) while the caught laundry does not easily slip from the inclined side surfaces, lifted up a certain height by the rotation of the drum (56), and subsequently drops by its own weight, thereby increasing the agitation of the laundry and size of the contact surfaces of the inclined side surfaces (72,74;82,84) with the laundry and the wash water and improving the washing and rinsing performance of the drum-type washing machine.

Fig. 4



EP 1 433 887 A1

Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a drum-type washing machine provided with a plurality of vanes installed at the inner wall of a drum for lifting up laundry and allowing the lifted laundry to drop so as to wash the laundry, and more particularly to a drum-type washing machine provided with a plurality vanes, each having an improved shape so as to increase the size of a contact surface with the laundry and wash water and to laterally move the laundry by the rotation of a drum, thereby improving washing and rinsing performance.

Description of the Related Art

[0002] Generally, each of drum-type washing machines comprises a drum and a tub enclosing the drum, and washes laundry by means of friction between the laundry and the drum rotated by the driving force of a motor, under the condition that the laundry together with a detergent and wash water is introduced into the drum. Accordingly, the drum-type washing machines do not damage the laundry, prevent the laundry from getting tangled, and have the same effect as the conventional hand-washing case that the laundry is beaten and rubbed by hand.

[0003] Fig. 1 is a longitudinal-sectional view of a conventional drum-type washing machine. Fig. 2 is a perspective view of a vane of the conventional drum-type washing machine. Fig. 3 is a cross-sectional view taken along a line a-a of Fig. 1.

[0004] As shown in Fig. 1, the conventional drum-type washing machine comprises a cabinet 2, a tub 4, a drum 6, a motor 8, a spider 10, a rotary shaft 12, and a plurality of vanes 20. The cabinet 2 includes an opening (not shown) formed through its front surface, and a door 2a attached to the front surface so as to open and close the opening. The tub 4 is horizontally installed within the cabinet 2 so as to contain wash water. The drum 6 is rotatably installed within the tub 4 so that the laundry is put into the drum 6, and then washed by friction between the laundry and the inner wall of the drum 6 due to the rotation of the drum 6. The motor 8 is installed at the rear of the tub 4, and generates a rotary force to rotate the drum 6. The spider 10 is interposed between the motor 8 and the drum 6, and fixed to the rear surface of the drum 6, thereby transmitting the rotary force of the motor 8 to the drum 6. The rotary shaft 12 is connected to the spider 10 and the motor 8. The vanes 20, which are spaced from each other by a designated interval, protrude from the inner wall of the drum 6. When the drum 6 rotates, the vanes 20 lift up the laundry introduced into the drum 6.

[0005] Here, each of the tub 4 and the drum 6 has a cylindrical shape with an opening at its front surface so that the laundry is put into the tub 4 and the drum 6 via their openings. A plurality of dehydration holes are formed through the inner wall of the drum 6. The vanes 20 are installed at the inner wall of the drum 6 so as to protrude from the inner wall of the drum 6.

[0006] As shown in Figs. 2 and 3, each of the vanes 20 includes two side surfaces 22 and 24 which are inclined upward, and front and rear surfaces 26 and 28. The two inclined side surfaces 22 and 24 are interconnected at their top ends. The front and rear surfaces 26 and 28 are respectively attached to front and rear ends of the two inclined side surfaces 22 and 24. The interior of the vane 20 is hollow, and the vane 20 is attached at its bottom surface to the drum 6, and includes holes 20a formed through its top surface, thus allowing the wash water to be circulated therethrough.

[0007] Each of the two inclined side surfaces 22 and 24 has a flat planar shape. The top surface of the vane 20 where the two inclined side surfaces 22 and 24 are interconnected is parallel with a central axis (C) of the rotary shaft 12 of the drum 6. The bottom surface of the vane 20, which is fixed to the inner wall of the drum 6, has a rectangular shape longitudinally parallel with the central axis (C) of the rotary shaft 12 of the drum 6.

[0008] Therefore, when the drum 6 rotates, the laundry laid on the bottom of the drum 6 is caught on the vanes 20 and lifted up in the circumferential direction of the drum 6 to more than a certain height. Then, the laundry drops to the bottom of the drum 6 by its own weight. The laundry introduced within the drum 6 is washed and rinsed by repetitions of such operations of the vanes 20 of the drum 6 and the uneven structure of the interior space of the drum 6.

[0009] Since each of the two inclined side surfaces 22 and 24 of the vane 20 has a flat planar shape, the laundry caught on the vanes 20 easily slips down along the inclined side surfaces 22 and 24. Accordingly, in case of the conventional drum-type washing machine, it is difficult to lift up the laundry to more than a certain height, thus having a limit in improving washing and rinsing performance.

[0010] Further, since the vanes 20 are parallel with the central axis (C) of the rotary shaft 12 of the drum 6, the laundry moves along the inner circumference of the drum 6 only in a vertical direction. Therefore, in case that the laundry is carelessly and randomly introduced into the drum 6, the laundry is eccentrically distributed in the drum 6, thus generating high vibration and noise during the high-speed rotation of the drum 6.

SUMMARY OF THE INVENTION

[0011] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a drum-type washing machine provided with improved vanes to allow the laundry to be easily caught thereon and lifted up to more

than a certain height and subsequently to drop by its own weight, thereby increasing the agitation of the laundry and increasing washing and rinsing performance of the washing machine.

[0012] In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of a drum-type washing machine comprising: a tub for containing wash water, being horizontally installed within a cabinet; a drum for accommodating the laundry, being rotatably installed within the tub; and a plurality of vanes protruding from an inner wall of the drum, each vane including two inclined side surfaces, wherein at least one of the two inclined side surfaces is concave so as to vertically lift up and subsequently drop the laundry by a rotation of the drum, and simultaneously to increase a size of its contact surface with the wash water and the laundry.

[0013] In accordance with another aspect of the present invention, there is provided a drum-type washing machine comprising: a tub for containing wash water, being horizontally installed within a cabinet; a drum for accommodating the laundry, being rotatably installed within the tub; and a plurality of vanes protruding from an inner wall of the drum, each vane including two inclined side surfaces, wherein a top surface of each of the vanes, where the two inclined side surfaces are interconnected, is formed in a straight line at a predetermined angle to a central axis of a rotary shaft of the drum so that the vanes guide the laundry and laterally move the laundry by the rotation of the drum.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a longitudinal-sectional view of a conventional drum-type washing machine;
Fig. 2 is a perspective view of a vane of the conventional drum-type washing machine;
Fig. 3 is a cross-sectional view taken along a line a-a of Fig. 1;
Fig. 4 is a longitudinal-sectional view of a drum-type washing machine in accordance with a first embodiment of the present invention;
Fig. 5 is a perspective view of a vane of the drum-type washing machine in accordance with the first embodiment of the present invention;
Fig. 6 is a cross-sectional view taken along a line A-A of Fig. 5;
Fig. 7 is a cross-sectional view taken along a line B-B of Fig. 5;
Fig. 8 is a cross-sectional view taken along a line C-C of Fig. 5;
Fig. 9 is a longitudinal-sectional view of a drum-type washing machine in accordance with a second embodiment of the present invention;
Fig. 10 is a perspective view of a vane of the drum-type washing machine in accordance with the second embodiment of the present invention; and
Fig. 11 is a cross-sectional view taken along a line D-D of Fig. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] Now, preferred embodiments of the present invention will be described in detail with reference to the annexed drawings.

[0016] Fig. 4 is a longitudinal-sectional view of a drum-type washing machine in accordance with a first embodiment of the present invention. Fig. 5 is a perspective view of a vane of the drum-type washing machine in accordance with the first embodiment of the present invention. Figs. 6, 7 and 8 are cross-sectional views taken along lines A-A, B-B, and C-C of Fig. 5, respectively.

[0017] As shown in Fig. 4, the drum-type washing machine in accordance with the first embodiment of the present invention comprises a cabinet 52, a tub 54, a drum 56, a motor 58, a spider 60, a rotary shaft 62, and a plurality of vanes 70. The cabinet 52 includes an opening (not shown) formed through its front surface, and a door 52a attached to the front surface so as to open and close the opening. The tub 54 for containing wash water is horizontally installed within the cabinet 52 so that the outer wall of the tub 54 is parallel with the inner wall of the cabinet 52. The drum 56 is rotatably installed within the tub 54 so that the laundry is contained by the drum 56 and washed by friction between the laundry and the inner wall of the drum 56 by the rotation of the drum 56. The motor 58 is installed at the rear of the tub 54, and generates a rotary force to rotate the drum 56. The spider 60 is interposed between the motor 58 and the drum 56, and fixed to the rear surface of the drum 56, thereby transmitting the rotary force of the motor 58 to the drum 56. One end of the rotary shaft 62 is connected to the spider 60, and the other end of the rotary shaft 62 is connected to the motor 58. The vanes 70, which are spaced from each other by a designated interval, protrude from the inner wall of the drum 56. When the drum 56 rotates, the vanes 70 lift up the laundry located within the drum 56, and simultaneously guide the laundry in a lateral direction.

[0018] The drum-type washing machine of the present invention further comprises water supply means 64 for supplying wash water into the tub 54 and the drum 56 in a wash mode, and drainage means 66 for draining the tub 54 and the drum 56 in a rinse or dehydration mode.

[0019] Here, each of the tub 54 and the drum 56 has a cylindrical shape with an opening for receiving the laundry therethrough. A plurality of dehydration holes

56a are formed through the inner wall of the drum 56. The vanes 70 are installed at the inner wall of the drum 56 so as to protrude from the inner wall of the drum 56.

[0020] As shown in Fig. 5, each of the vanes 70 includes two inclined side surfaces 72 and 74 which are inclined upward, and front and rear surfaces 76 and 78. The two inclined side surfaces 72 and 74 are interconnected at their top ends. The front and rear surfaces 76 and 78 are respectively attached to front and rear ends of the two inclined side surfaces 72 and 74. Each of the vanes 70 is opened at its bottom surface, and includes holes 70a formed through its top surface and spaced from each other by a designated distance, thus allowing the wash water to be circulated therethrough.

[0021] Each of the two inclined side surfaces 72 and 74 is concave, thereby increasing the size of its contact surface with the wash water and the laundry, and preventing the laundry from easily slipping therefrom. The top surface of the vane 70, where the two inclined side surfaces 72 and 74 are interconnected, is formed in a straight line so as not to be parallel with the central axis (C) of the rotary shaft 62 of the drum 56, i.e., so as to be at a predetermined angle to the central axis (C). The bottom surface of the vane 70, which is fixed to the inner wall of the drum 56, has a rectangular shape so as to be parallel with the central axis (C) of the rotary shaft 62 of the drum 56.

[0022] That is, the top surface of the vane 70 is formed in a straight line so as not to be parallel with the central axis (C) of the rotary shaft 62 of the drum 56, while the bottom surface of the vane 70 has a rectangular shape so as to be parallel with the central axis (C) of the rotary shaft 62 of the drum 56. Therefore, angles (α, β) between the inner wall of the drum 56 and the inclined side surfaces 72 and 74 gradually vary according to regions of the vane 70, i.e., from the front end of the vane 70 to the rear end of the vane 70.

[0023] More specifically, as shown in Figs. 6 to 8, the angle (α) between the inner wall of the drum 56 and the inclined side surface 72 linearly decreases from the front end to the rear end. On the other hand, the angle (β) between the inner wall of the drum 56 and the inclined side surface 74 linearly increases from the front end to the rear end. Herein, the angle (α) between the inner wall of the drum 56 and the inclined side surface 72 at the front end of the vane 70 is in the range of 80° to 90°, the angle (β) between the inner wall of the drum 56 and the inclined side surface 74 at the front end of the vane 70 is in the range of 20° to 30°. The angle (α) between the inner wall of the drum 56 and the inclined side surface 72 at the rear end of the vane 70 is in the range of 20° to 30°, the angle (β) between the inner wall of the drum 56 and the inclined side surface 74 at the rear end of the vane 70 is in the range of 80° to 90°.

[0024] Fig. 9 is a longitudinal-sectional view of a drum-type washing machine in accordance with a second embodiment of the present invention. Fig. 10 is a perspective view of a vane of the drum-type washing machine in accordance with the second embodiment of the present invention. Fig. 11 is a cross-sectional view taken along a line D-D of Fig. 10.

[0025] As shown in Fig. 9, the drum-type washing machine of the second embodiment has a configuration similar to that of the drum-type washing machine of the first embodiment. The drum-type washing machine in accordance with the second embodiment of the present invention comprises a plurality of vanes 80. The vanes 80, which are spaced from each other by a designated interval, protrude from the inner wall of the drum 56. When the drum 56 rotates, the vanes 70 serve to lift up the laundry and simultaneously lift up the wash water.

[0026] As shown in Figs. 10 and 11, each of the vanes 80 includes two side surfaces 82 and 84 which are inclined upward, and front and rear surfaces 86 and 88. The two inclined side surfaces 82 and 84 are interconnected at their top ends. The front and rear surfaces 86 and 88 are respectively attached to front and rear ends of the two inclined side surfaces 82 and 84. Each of the vanes 80 is opened at its bottom surface, and includes holes 80a formed through its top surface and spaced from each other by a designated distance, thus allowing the wash water to be circulated therethrough.

[0027] Each of the two inclined side surfaces 82 and 84 is concave, thereby containing wash water and lifting up the contained water when the drum 56 rotates. The top surface of the vane 80, where the two inclined side surfaces 82 and 84 are interconnected, is formed in a curved line.

[0028] Particularly, each of the vanes 80 has an S shape so as to contain wash water regardless of the direction of the rotation of the drum 56, i.e., whether the drum 56 rotates in the normal direction or in the opposite direction.

[0029] Since the two inclined side surfaces 82 and 84 of the vane 80 are concave, when the drum wash is operated in a wash or rinse mode by the rotations of the drum 56 and the vanes 80 thereof, the laundry is easily caught on the inclined side surfaces 82 and 84, while the laundry does not easily slip from the inclined side surfaces 82 and 84. Accordingly, it is possible to lift the laundry to a higher position. Further, since the vane 80 has an S shape, the vane 80 contains the wash water as well as the laundry, thereby improving the washing and rinsing performance of the drum-type washing machine.

[0030] Now, the operation of the above-described drum-type washing machine in accordance with the present invention is described, as follows.

[0031] When the drum-type washing machine is operated, the required foam level is sensed, and then wash water is supplied to the tub 54 and the drum 56 to a designated level. The motor 58 is driven, and subsequently the drum 56 rotates in the normal or opposite direction, thereby performing a washing or rinsing mode.

[0032] The vanes 70 installed at the inner wall of the drum 56 are revolved around the rotary shaft 62 by the

rotation of the drum 56. The laundry laid on the bottom of the drum 56 is caught on the vanes 70. Then, the laundry caught on the vanes 70 is lifted up to more than a certain height along the circumferential direction of the drum 56, and then drops to the bottom of the drum 56 by its own weight. The washing and rinsing of the laundry are performed by the mechanical force of such an operation of the vanes 70 and the uneven structure of the inner wall of the drum 56.

[0033] Since the two inclined side surfaces 72 and 74 of the vanes 70 are concave, the laundry is easily caught on the inclined side surfaces 72 and 74, while the laundry does not easily slip from the inclined side surfaces 72 and 74. Accordingly, the vanes 70 lift the laundry higher, thereby improving the washing and rinsing performance.

[0034] The vanes 70 are positioned at a predetermined angle to the central axis (C) of the rotary shaft 62 of the drum 56. When the drum 56 is rotated in the normal direction, the vanes 70 guide the laundry caught thereon and laterally move the laundry along their tilted top surfaces toward the rear area of the drum 56. On the other hand, when the drum 56 is rotated in the opposite direction, the vanes 70 guide the laundry caught thereon and laterally move the laundry along their tilted top surfaces toward the front area of the drum 56. Accordingly, the vanes 70 move the laundry in the lateral direction of the drum 56, thus improving the washing and rinsing performance.

[0035] After the washing and rinsing mode is performed, the motor 58 is driven, and subsequently the drum 56 is rotated at a low speed in the normal direction, thereby allowing the laundry caught on the vanes 70 to be guided along the top surfaces of the vanes 70 toward the rear area of the drum 56. Then, when the drum 56 is rotated at a high speed, water contained in the laundry is discharged to the tub 56 via the dehydration holes 56a of the drum 56 by the centrifugal force, thus performing a dehydration mode.

[0036] The dehydration mode is performed under the condition that the laundry is guided by the vanes 70 toward the rear area of the drum 56 and located adjacent to the rotary shaft 62. Accordingly, it is possible to reduce an unbalanced distribution of the laundry within the drum 56 and to decrease vibration and noise generated in the dehydration mode at a high speed.

[0037] As apparent from the above description, the present invention provides a drum-type washing machine provided with a plurality of vanes, each including two inclined side surfaces, which are concave, installed at an inner wall of a drum so that the laundry is easily caught on the inclined side surfaces while the caught laundry does not easily slip from the inclined side surfaces, lifted up a certain height by the rotation of the drum, and subsequently drops by its own weight, thereby increasing the agitation of the laundry and size of the contact surfaces of the inclined side surfaces with the laundry and the wash water and improving the washing and rinsing performance of the drum-type washing machine.

[0038] Since a top surface of each vane, where the two inclined side surfaces are interconnected, is positioned at a predetermined angle to a central axis of a rotary shaft of the drum, the laundry caught on the vane is guided along its top surface so as to move back and forth. Accordingly, it is possible to uniformly distribute the laundry within the drum, thereby improving the washing and rinsing performance of the drum-type washing machine. Further, it is possible to move the laundry to the rear area of the drum in a dehydration mode, thereby decreasing an unbalanced degree of the distribution of the laundry within the drum and reducing vibration and noise generated in the dehydration mode.

[0039] Moreover, each vane includes the two inclined side surfaces, which are concave, and simultaneously the top surface of the vane has an S shape. Accordingly, the inclined side surfaces lift up the wash water using their concave portions, thereby circulating the wash water and further improving the washing and rinsing performance of the drum-type washing machine.

[0040] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A drum-type washing machine comprising:

   a tub for containing wash water, being horizontally installed within a cabinet;
   a drum for accommodating the laundry, being rotatably installed within the tub; and
   a plurality of vanes protruding from an inner wall of the drum, each vane including two inclined side surfaces,

   wherein at least one of the two inclined side surfaces is concave so as to vertically lift up and subsequently drop the laundry by a rotation of the drum, and simultaneously to increase a size of its contact surface with the wash water and the laundry.

2. The drum-type washing machine as set forth in claim 1,

   wherein both of the two inclined side surfaces of each of the vanes are concave.

3. The drum-type washing machine as set forth in claim 2,

   wherein a top surface of each of the vanes, where the two inclined side surfaces are interconnected, is formed in a straight line at a predeter-

mined angle to a central axis of a rotary shaft of the drum so that the vane guides the laundry and laterally moves the laundry by the rotation of the drum.

4. The drum-type washing machine as set forth in claim 3,

wherein a bottom surface of each of the vanes, being fixed to the inner wall of the drum, has a rectangular shape and is positioned to be paralleled with the central axis of the rotary shaft of the drum.

5. The drum-type washing machine as set forth in claim 4,

wherein an angle (α) between the inner wall of the drum and one of the two inclined side surfaces is decreased from the front end of the vane to the rear end of the vane, and an angle (β) between the inner wall of the drum and the other of the two inclined side surfaces is increased from the front end of the vane to the rear end of the vane.

6. The drum-type washing machine as set forth in claim 5,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces are linearly varied from the front end of the vane to the rear end of the vane.

7. The drum-type washing machine as set forth in claim 6,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the front end of the vane is in the range of 80° to 90°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the front end of the vane is in the range of 20° to 30°; and

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the rear end of the vane is in the range of 20° to 30°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the rear end of the vane is in the range of 80° to 90°.

8. The drum-type washing machine as set forth in claim 4,

wherein an angle (α) between the inner wall of the drum and one of the two inclined side surfaces is increased from the front end of the vane to the rear end of the vane, and an angle (β) between the inner wall of the drum and the other of the two inclined side surfaces is decreased from the front end of the vane to the rear end of the vane.

9. The drum-type washing machine as set forth in claim 8,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces are linearly varied from the front end of the vane to the rear end of the vane.

10. The drum-type washing machine as set forth in claim 9,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the front end of the vane is in the range of 20° to 30°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the front end of the vane is in the range of 80° to 90°; and

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the rear end of the vane is in the range of 80° to 90°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the rear end of the vane is in the range of 20° to 30°.

11. The drum-type washing machine as set forth in claim 1,

wherein a top surface of each of the vanes, where the two inclined side surfaces are interconnected, is formed in a curved line so that the vanes contain the wash water to lift up the wash water and subsequently to drop the wash water.

12. The drum-type washing machine as set forth in claim 11,

wherein the top surface of each of the vanes, where the two inclined side surfaces are interconnected, has an S shape.

13. A drum-type washing machine comprising:

a tub for containing wash water, being horizontally installed within a cabinet;
a drum for accommodating the laundry, being rotatably installed within the tub; and
a plurality of vanes protruding from an inner wall of the drum, each vane including two inclined side surfaces,

wherein a top surface of each of the vanes, where the two inclined side surfaces are interconnected, is formed in a straight line at a predetermined angle to a central axis of a rotary shaft of the drum so that the vanes guide the laundry and laterally move the laundry by the rotation of the drum.

14. The drum-type washing machine as set forth in

claim 13,

wherein a bottom surface of each of the vanes, being fixed to the inner wall of the drum, has a rectangular shape and is positioned to be paralleled with the central axis of the rotary shaft of the drum.

15. The drum-type washing machine as set forth in claim 14,

wherein an angle (α) between the inner wall of the drum and one of the two inclined side surfaces is decreased from the front end of the vane to the rear end of the vane, and an angle (β) between the inner wall of the drum and the other of the two inclined side surfaces is increased from the front end of the vane to the rear end of the vane.

16. The drum-type washing machine as set forth in claim 15,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces are linearly varied from the front end of the vane to the rear end of the vane.

17. The drum-type washing machine as set forth in claim 16,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the front end of the vane is in the range of 80° to 90°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the front end of the vane is in the range of 20° to 30°; and

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the rear end of the vane is in the range of 20° to 30°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the rear end of the vane is in the range of 80° to 90°.

18. The drum-type washing machine as set forth in claim 14,

wherein an angle (α) between the inner wall of the drum and one of the two inclined side surfaces is increased from the front end of the vane to the rear end of the vane, and an angle (β) between the inner wall of the drum and the other of the two inclined side surfaces is decreased from the front end of the vane to the rear end of the vane.

19. The drum-type washing machine as set forth in claim 18,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces are linearly varied from the front end of the vane to the rear end of the vane.

20. The drum-type washing machine as set forth in claim 19,

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the front end of the vane is in the range of 20° to 30°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the front end of the vane is in the range of 80° to 90°; and

wherein the angle (α) between the inner wall of the drum and one of the two inclined side surfaces at the rear end of the vane is in the range of 80° to 90°, and the angle (β) between the inner wall of the drum and the other of the two inclined side surfaces at the rear end of the vane is in the range of 20° to 30°.

Fig. 1(Prior Art)

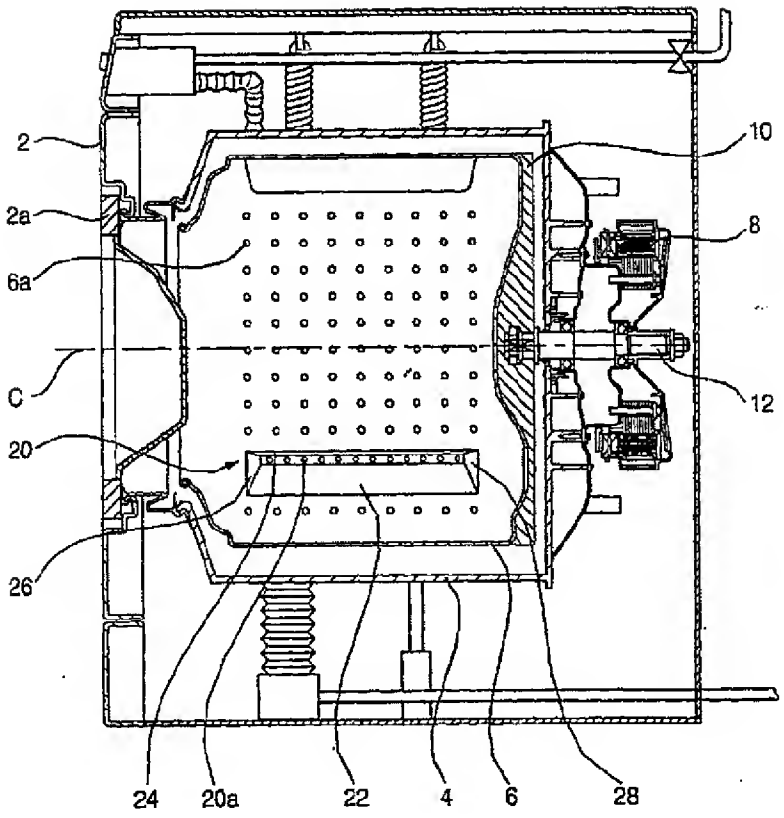


Fig. 2(Prior Art)

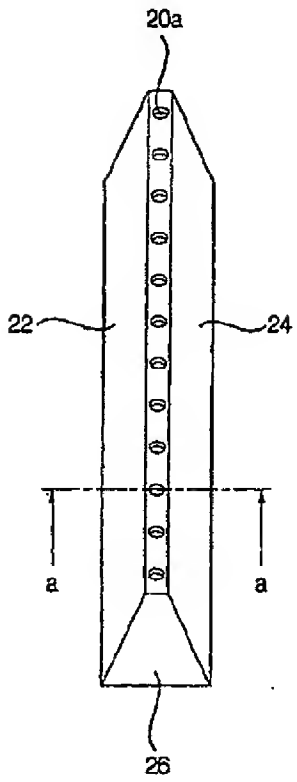


Fig. 3(Prior Art)

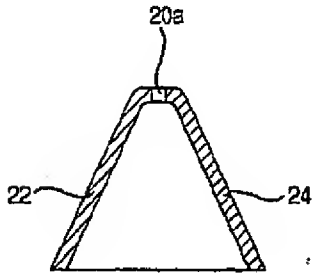


Fig. 4

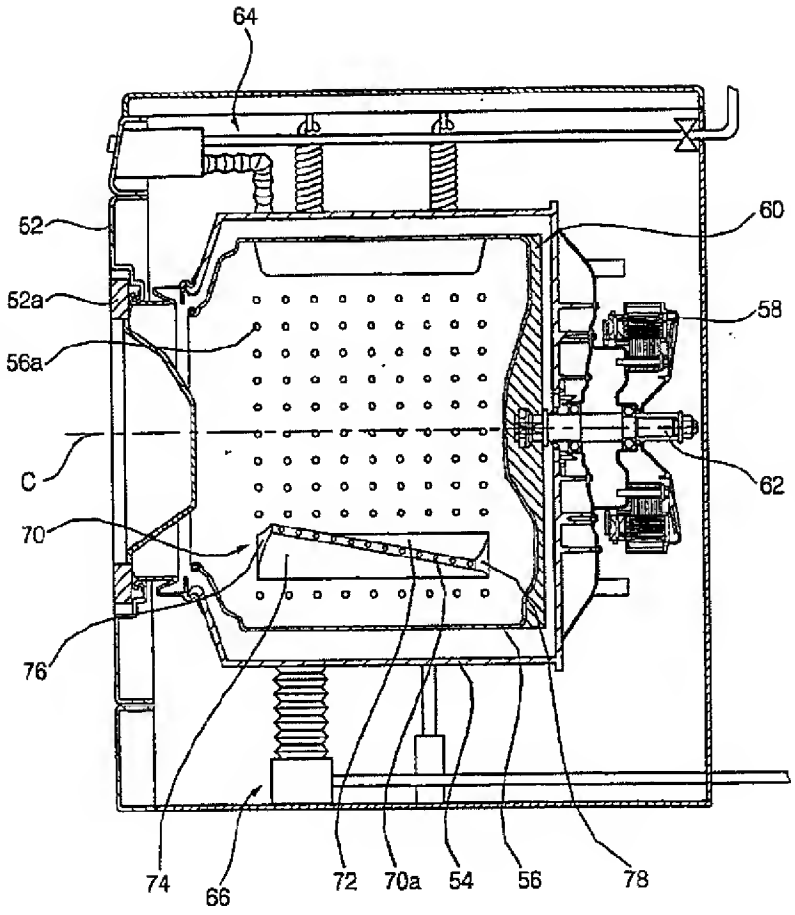


Fig. 5

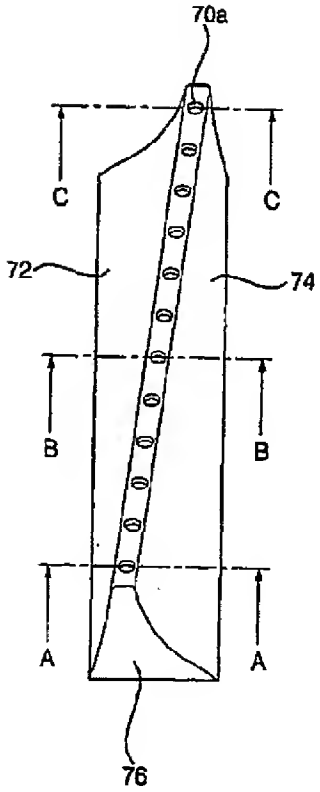


Fig. 6

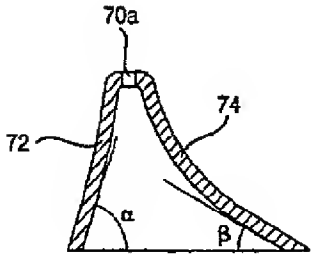


Fig. 7

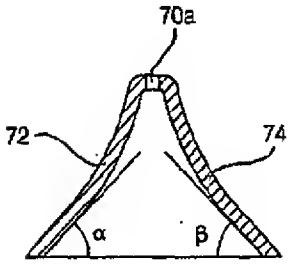


Fig. 8

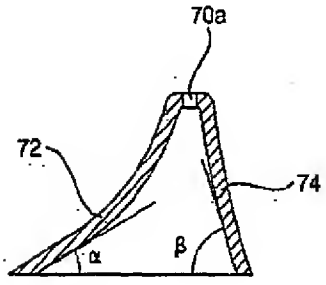


Fig. 9

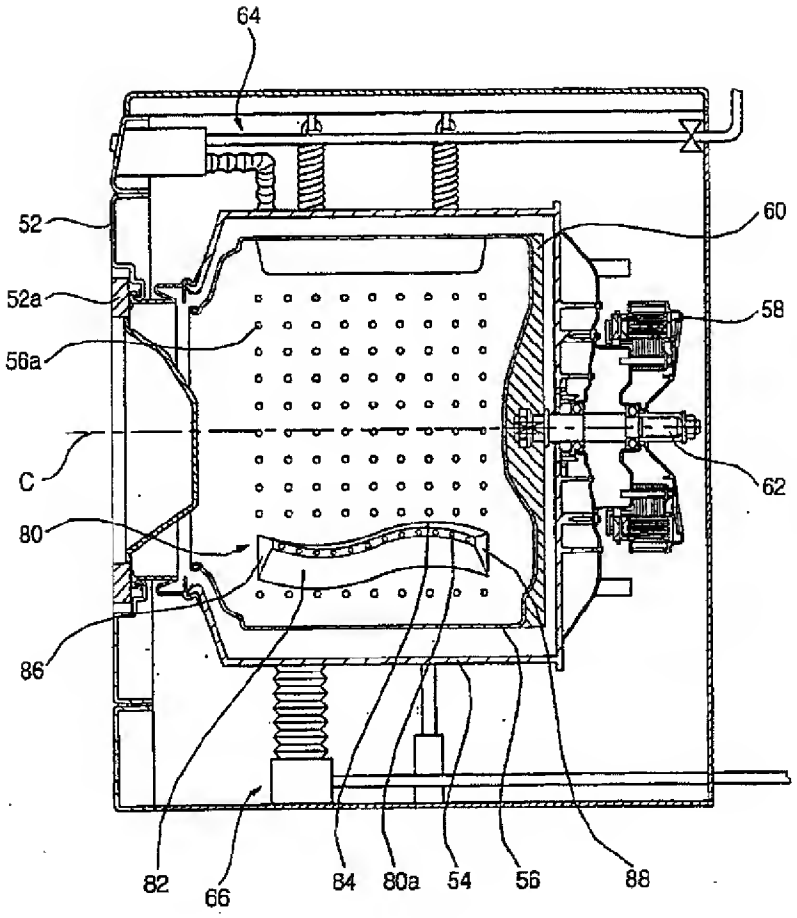


Fig. 10

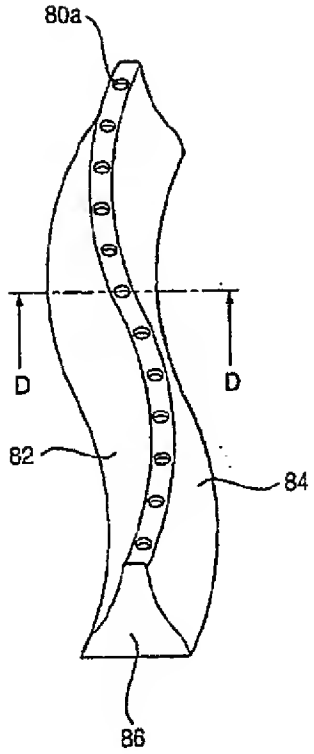
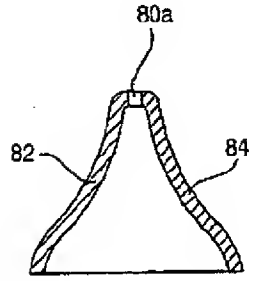


Fig. 11



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Application Number
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MUNICH	19 March 2004	Falkentoft, C

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